

WHAT IS CLAIMED IS:

1. A method for depositing material on a semiconductor wafer, wherein the wafer temperature is maintained within a temperature range, the method comprising:
providing a target comprising the material to be deposited;
supporting the wafer on a chuck, wherein the wafer is positioned between the target and the chuck;
depositing material from the target on the wafer in response to particles impinging the target; and
controlling the wafer temperature within the temperature range by controlling the chuck temperature.
2. The method of claim 1 wherein the step of supporting the wafer further comprises supporting the wafer in a spaced apart relation from the chuck.
3. The method of claim 1 wherein the wafer is thermally coupled to the chuck by radiant heat flow.
4. The method of claim 3 wherein the wafer temperature is substantially determined by the radiant heat flow.
5. The method of claim 1 further comprising positioning the wafer at a distance from the target such that the chuck temperature substantially determines the wafer temperature.
6. The method of claim 1 wherein the material comprises aluminum or an aluminum alloy.
7. The method of claim 1 wherein the temperature range comprises temperatures between about 245° C and 285° C.
8. The method of claim 1 wherein the step of controlling the wafer temperature comprises controlling the chuck temperature between about 350° C and 450° C.
9. The method of claim 1 further comprising determining the wafer entry temperature prior to the step of depositing, wherein the step of controlling the wafer temperature further comprises controlling the chuck temperature in response to the wafer entry temperature.
10. The method of claim 1 wherein the step of depositing further comprises depositing material with a $\langle 111 \rangle$ crystal orientation on the wafer.

11. The method of claim 1 further comprising depositing an underlying layer on the wafer prior to depositing the material, wherein the underlying layer has a predetermined crystal orientation.
12. The method of claim 11 wherein the underlying layer comprises titanium having a $\langle 002 \rangle$ crystal orientation.
13. The method of claim 12 wherein the deposited material exhibits a desired grain orientation.
14. The method of claim 1 wherein the step of positioning the wafer further comprises positioning the wafer at a distance of about 45 mm from the target.
15. A physical vapor deposition chamber for depositing material on a wafer, wherein the wafer temperature is maintained within a temperature range, comprising:
 - a target formed from the material to be deposited on the wafer;
 - a chuck for supporting the wafer;
 - a chuck heater; and
 - a controller for controlling the chuck heater such that the wafer temperature is within the temperature range.
16. The physical vapor deposition chamber of claim 15 wherein the wafer is heated by radiant heat flow from the chuck to the wafer.
17. The physical vapor deposition chamber of claim 15 wherein the wafer temperature is substantially determined by the chuck temperature.
18. The physical vapor deposition chamber of claim 15 wherein the wafer and the target are disposed in a spaced-apart relation.
19. The physical vapor deposition chamber of claim 18 wherein the spaced-apart relation comprises about 45 mm.
20. The physical vapor deposition chamber of claim 15 further comprising a pedestal cover overlying the chuck, wherein the pedestal cover further comprises a plurality of pads on an upper surface thereof, and wherein the wafer is disposed on the plurality of pads.
21. The physical vapor deposition chamber of claim 15 wherein the material comprises aluminum or an aluminum alloy.
22. The physical vapor deposition chamber of claim 15 wherein the temperature range is between about 245° C and 285° C.

23. The physical vapor deposition chamber of claim 15 wherein the controller determines a chuck temperature in a range of between about 350° C and 450° C.

24. The physical vapor deposition chamber of claim 15 further comprising a temperature measuring device for determining the wafer temperature, wherein the controller is responsive to the wafer temperature for controlling the chuck heater in response thereto.

25. The physical vapor deposition chamber of claim 15 wherein the deposited material has a substantially $\langle 111 \rangle$ crystal orientation.

26. The physical vapor deposition chamber of claim 15 wherein the deposited material exhibits a desired grain orientation.